

CLAIMS:

1. A polypeptide for use as an autotransporter antigen, the polypeptide comprising:
 - 5 (a) an amino acid sequence selected from the group consisting of SEQ ID NO: 54, SEQ ID NO: 6, SEQ ID NO: 55, SEQ ID NO: 56, SEQ ID NO: 78, and SEQ ID NO: 79,
 - (b) an amino acid sequence having at least 50% sequence identity to an amino acid sequence of (a); or
 - 10 (c) an amino acid sequence comprising one or more fragments of at least 7 consecutive amino acids from an amino acid sequence of (a) or combinations thereof.
2. The polypeptide of claim 1 where use is as an antigen for raising a Chlamydia pneumoniae specific immune response
- 15 3. The polypeptide of claim 2 wherein the use is for raising a systemic immune response in an individual infected with Chlamydia pneumoniae.
4. The polypeptide of any one of claims 1-3 which is secreted into the cytoplasm of the host cell through a Type V autotransporter secretion system mechanism.
- 20 5. The polypeptide of any one of claims 1-3 wherein the polypeptide is selected from the group consisting of SEQ ID NO: 54, SEQ ID NO: 6, SEQ ID NO: 55, SEQ ID NO: 56, SEQ ID NO: 78, and SEQ ID NO: 79 and share one or more common N-terminal sequence motifs selected from the group consisting of G, DG, VG, G, AV, G, IVG, GTLGG, S, IVG, and M.
- 25 6. The polypeptide of claim 5 wherein the common N-terminal sequence motif is selected from the group consisting of GTLGG, S, IVG and M.
- 30 7. The polypeptide of any one of claims 1-3 for use in diagnosis.
8. The use of a polypeptide according to any one of claims 1-3 in the preparation of a medicament for the prevention or treatment of a Chlamydia pneumoniae infection in an individual.
- 35 9. The use according to claim 8 wherein the use is of an autotransporter protein which immunoreacts with seropositive serum of an individual infected with Chlamydia pneumoniae.
- 40 10. The use of a polypeptide according to any one of claims 1-3 in the preparation of an assay for the diagnosis of a Chlamydia pneumoniae infection in an individual.
- 45 11. A method of eliciting an immune response in an individual comprising administering to the individual a polypeptide comprising:
 - (a) an amino acid sequence selected from the group consisting of SEQ ID NO: 54, SEQ ID NO: 6, SEQ ID NO: 55, SEQ ID NO: 56, SEQ ID NO: 78, and SEQ ID NO: 79,
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(b) an amino acid sequence having at least 50% sequence identity to an amino acid sequence of (a), or

(c) an amino acid sequence comprising one or more fragment of at least 1, 2, 3, 4, 5, 6, or 7 amino acids from an amino acid sequence of (a) or mixtures thereof.

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12. A method of diagnosing an immune response in an individual comprising:

(a) contacting a biological sample obtained from the individual with a binding agent that binds to a polypeptide according to any one of claims 1-3;

10 (b) detecting in the biological sample the amount of the polypeptide that binds to the binding agent; and

(c) comparing the amount of the polypeptide to a predetermined cut-off value and thereby determining the presence of an immune response in the individual.

15 13. The method of claim 11 or claim 12 wherein the polypeptide is defined according to any one of claims 1-3.

14. The method of claim 11 or the use of according to any one of claims 2-6 or 8-9 wherein the polypeptide.

20 15. A composition for eliciting an immune response comprising one or more Chlamydia pneumoniae autotransporter proteins or immunogenic fragments thereof and one or more immunostimulants.

25 16. The composition according to claim 15 wherein the Chlamydia pneumoniae autotransporter protein or the immunogenic fragment thereof comprises:

(a) an amino acid sequence selected from the group consisting of SEQ ID NO: 54, SEQ ID NO: 6, SEQ ID NO: 55, SEQ ID NO: 56, SEQ ID NO: 78, SEQ ID NO: 86 and SEQ ID NO: 79;

30 (b) an amino acid sequence having at least 50% sequence identity to an amino acid sequence of (a); or

(c) an amino acid sequence comprising one or more fragments of at least 1, 2, 3, 4, 5, 6 or 7 amino acids from an amino acid sequences of (a) or combinations thereof.

35 17. The composition according to claim 15 or 16 wherein the protein or immunogenic fragment thereof is defined according to any one of claims 1-3.

40 18. A composition for eliciting an immune response in a subject comprising two or more Chlamydia pneumoniae autotransporter proteins or immunogenic fragments thereof.

19. The composition according to claim 18 wherein the Chlamydia pneumoniae autotransporter protein or the immunogenic fragment thereof comprises:

45 (a) an amino acid sequence selected from the group consisting of SEQ ID NO: 54, SEQ ID NO: 6, SEQ ID NO: 55, SEQ ID NO: 56, SEQ ID NO: 78, SEQ ID NO: 86 and SEQ ID NO: 79;

(b) an amino acid sequence having at least 50% sequence identity to an amino acid sequence of (a); or

(c) an amino acid sequence comprising one or more fragments of at least 1, 2, 3, 4, 5, 6 or 7 amino acids from an amino acid sequences of (a) or combinations thereof.

5 20. The composition according to claim 18 or 19 wherein the composition further comprises one or more immunostimulants.

10 21. A method of making a composition according to any one of claims 15 or 16 wherein the method comprises combining one or more Chlamydia pneumoniae autotransporter proteins or immunogenic fragments thereof with one or more immunostimulants.

15 22. A method of making a composition according to claim 18 or 19 wherein the method comprises combining two or more Chlamydia pneumoniae autotransporter proteins or immunogenic fragments thereof.

20 23. The method according to claim 22 wherein the method comprises adding one or more immunostimulants to the Chlamydia pneumoniae autotransporter proteins or immunogenic fragments thereof.

25 24. A Chlamydia pneumoniae autotransporter protein selected from the group consisting of Cpn0794, Cpn0795, Cpn0796, Cpn0797, CPn0798 and Cpn0799 or an immunogenic fragment thereof wherein the autotransporter protein an amino acid motif comprising IVG, A, LGG and S.

 25. The autotransporter protein according to claim 24 wherein the repeat amino acid motif comprises IVG, A, LGG and S.

30 26. A polypeptide for use as an autotransporter antigen comprising an amino acid sequence corresponding to SEQ ID NO: 86, an amino acid sequence having at least 50% sequence identity to SEQ ID NO: 86, or an amino acid sequence comprising one or more fragments of at least 7 consecutive amino acids of SEQ ID NO: 86.

35 27. The polypeptide of claim 26 where use is as an antigen for raising a Chlamydia pneumoniae specific immune response

40 28. The polypeptide of claim 2 wherein the use is for raising a systemic immune response in an individual infected with Chlamydia pneumoniae.

 29. The use of a polypeptide according to any one of claims 26-28 in the preparation of a medicament for the prevention or treatment of a Chlamydia pneumoniae infection in an individual.

45 30. A method of raising an immune response in an individual, the method comprising administering to the individual a polypeptide comprising an amino acid sequence corresponding to SEQ ID NO: 86, an amino acid sequence having at least 50% sequence identity to SEQ ID NO: 86, or an amino acid sequence comprising one or more fragments of at least 7 consecutive amino acids of SEQ ID NO: 86.

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31. A method of diagnosing an immune response in an individual, the method comprising:

- (a) contacting a biological sample obtained from an individual with a binding agent that binds to a polypeptide defined in any one of claims 26-28;
- 5 (b) detecting in the sample the amount of the polypeptide that binds to the binding agent; and
- (c) comparing the amount of polypeptide to a predetermined cut-off value and thereby determining the presence of an immune response in the individual.